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Exploring the Impact of Height and Body Shape on Athletic Performance

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ABSTRACT

This research investigates the impact of height and body type on sports performance, particularly in the case of combat sports—boxing, mixed martial arts, and Brazilian jiu-jitsu—among young athletes aged between 13 and 18 years in Sharjah, United Arab Emirates. Although literature identifies the benefits of certain body types in sports such as basketball or gymnastics, little is known about the transferability of these characteristics in combat sports, especially among younger athletes. Using a mixed-methods approach, anthropometric measurements—height, weight, and Body Mass Index (BMI)—were collected from 28 athletes at a local Mixed Martial Arts gym, with their performance data subsequently analyzed alongside survey results. Results indicate that mesomorphic (muscular) body types correlate with achievement in competitive weight-class athletics; yet, cardiovascular efficiency and joint durability—linked to proportional height-to-weight ratios—are equally valuable. The study refers to a trade-off between innate and trainable physical advantages in showing that while somatotype influences role specialization, intensive training and psychological toughness remain paramount for elite performance. The findings offer practical value to coaches and sporting apparel manufacturers interested in optimizing training programs and equipment design for youth athletes.



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Chapter I:

Introduction:

Numerous aspects related to the body and mind impact an athlete's performance, in sports factors like physique and stature are often seen as elements influencing success across various sports disciplines. In sports settings that prioritize attributes for athlete selection or classification purposes the importance of these traits becomes evidently crucial (according to Norton & Olds, in 2001). In gymnastics being shorter, with a body helps with balance and rotational speed while in basketball height provides an edge, for rebounding's and shooting according to Malina et al. (2004).

Studying how characteristics impact athletic performance is a focus, in the field of sports science nowadays. Researchers have discovered that these attributes play a role in determining the positions athletes play on teams and their overall achievements. For example, Carter and Heaths research from 1990 explored the idea of "somatotypes," or body types in relation to sports performance. Their findings revealed that muscular athletes known as mesomorphs tend to excel in strength focused sports such as rugby; whereas leaner athletes referred to as ectomorphs tend to perform in endurance-based activities, like long distance running.

While height and body shape confer formidable advantages, this does not mean that they can assure athletic success. The other major factors contributing to performance in sport come from training, skill development, and psychological strength (Reilly et al., 2009). This essay discusses how height and body shape influence different sports in terms of performance and role differentiation. It also looks into how these attributes interact with other factors like gender, training, and environmental influences to eventually determine an athlete's potential.

The first chapter introduces the topic of the study and the statement of the problem also conveys the objectives of the study, research questions, and significance of the study

The Objective of the study is for sportswear companies to focus their output of sizes of specific sports equipment to accommodate the supply and demand of users by seeing the body types which are best for each sport.

Focus and Scope

• Which country/region are you studying? The study will be carried out on athletes based in Sharjah, United Arab Emirates.

• What period will your research cover? The data used for this study comprises data gathered during a single session.

• Which populations or groups will you be working with? The target populations are the13–18 years old athletes who engage in boxing, mixed martial arts, and Brazilian jiujitsu in Sharjah.

• What are the specific issues or questions of the subject your dissertation concerns? The study is going to observe the influence of height and body shape variation on physical performance, injury susceptibility, and competitive success in combat sports.

Relevance and Importance Interest in the relations of some physical features-height and body type-with athletic achievements in combat sports has been directed in recent decades, but this level of interest still remains low in younger age groups. The literature so far describes only adult or professional athletes; therefore, this is a gapin the literature concerning teenagers, who are still developing.

The present study, therefore, attempts to fill this lacuna by studying teen athletes in the13-18 years age bracket participating in boxing, MMA, and Brazilian jiu-jitsu in the State of Sharjah, UAE. This would, in turn, ensure the availability of new empirical data of immense importance to coaches, trainers, and sports scientists in their unrelenting effort to enhance the training programs with a view to preventing injuries among young combat sports athletes.

While much prior research has focused more on adult performance and risk of injury, this paper builds on them to present issues concerning a teenage athlete. The current study seeks to contribute to the scholarly understanding of how height and body shape relate to performance in combat sports at an important juncture in the physical and athletic development of an individual. This will find high practical applicability in sports training and management and help to shape the evidence-based training protocol for teenagers to make athletic development safer and professionally sound. Theoretically, the study will contribute to a better understanding of biomechanics and physiology in combat sports by further developing the existing models and theories. It will also tend to fill the gap in literature, build on earlier related research into sports science, and be helpful to scholars in furthering a deeper insight into the role played by physical attributes in combat sport-specific criteria for younger athletes.

Chapter II:

Literature Review:

To begin with our aim to specifically conclude this scientific research about how our bodies work and why they matter is because this hasn't been done in the area of Sharjah before. We as an organization of premature researchers want to apply our research and find out if the way our bodies are formed are helpful in the sports out bodies play. Our research starts with a quote from a respected doctor, "Athleticism depends on a person's cardiac output and cardiac index, which is simply the amount of times your heart pumps blood per minute" (Dr. Obaid, 2025) this would in turn say that the heart is a really important part of your sports journey, if the cardiac output is good relative to your body surface basically if your heart pumps enough blood to support the humans body (cardiac index). A few examples are like if a person is too tall and weighs a lot your heart won't be able to pump enough blood to all your organs and your joints won't be able to handle due to the heavy pressure put on (whether fat or muscle) so you must have equality between your height and weight. Even if a person is overly muscular for his height it doesn't mean you're more athletic than others as your joints won't be able to support your weight meanwhile a person with a proper amount of muscle appropriate to their height will be much more athletic than an overly muscular or overweight individual. Which is why if a very tall person gets too heavy whether it's all muscle or fat his joints won't be able to handle all the weight and their heart won't be able to provide enough blood to their organs so it's actually disadvantageous for a very tall person to gain weight.

BMI is a medical screening tool that measures the ratio of your height to weight to estimate the percentage of fat in a person's body. Muscle and fat don't count as the same type of weight as even though muscle still does effect a person's joints badly it's still much much better that an obese person at the same weight and height. To put it simply, a overly muscular person would be more athletic than a fat person even if they're the same weight and height even if both put a lot of pressure on the joints and cardiovascular system. for maximum athletic performance you need a higher cardiovascular ability that's higher than your mass so more muscle isn't always better athletically as is has less pressure on your joints and your heart is more free to pass blood as your muscles aren't in need of a bigger amount due to a lower weight and muscle mass increasing ones athletic ability.

Dr. Ahmed M. Al-Dabbagh is an expert in exercise physiology and sports medicine, with a specific focus on how physical attributes, such as height and body composition, impact an athlete's performance across different sports. His research suggests that height plays a critical role in performance, "particularly in sports where physical reach and stride length are key factors."(Dr. Al-Dabbagh, 2024) Taller athletes tend to excel in sports like basketball, volleyball, and swimming, where their height offers an advantage in terms of reach, jump height, and overall physical presence. In swimming, for example, the longer limbs of a taller athlete help them cover more distance per stroke, contributing to faster times.

On the other hand, shorter athletes often thrive in sports requiring greater agility, speed, and balance, such as gymnastics, sprinting, and soccer. Dr. Al-Dabbagh explains that a lower center of gravity allows shorter athletes to maneuver quickly and change direction more easily. He emphasizes that body composition is equally important, as the amount of muscle mass relative to fat has a direct impact on performance. Athletes with a higher lean muscle mass perform better in strength-based activities like weightlifting or sprinting, where explosive power and speed are crucial. Dr. Al- Dabbagh's work highlights how maintaining an ideal body composition, through targeted nutrition and exercise, can help athletes optimize their potential by maximizing strength, endurance, and agility.

Another source to support this is the research of which delves into how body composition and height influence athletic performance, with a particular focus on the relationship between nutrition and physical conditioning. Dr. Al-Mohannadi notes that taller athletes may have a biomechanical advantage in certain sports that require longer limbs for efficiency. For instance, in rowing or basketball, the increased limb length allows athletes to generate more power with each stroke or jump, which translates into better performance. In contrast, shorter athletes excel in sports that emphasize explosive power, quickness, and flexibility, such as sprinting or martial arts. These athletes benefit from having a lower center of gravity, which helps them maintain balance and control at high speeds. Additionally, the importance of body composition in performance. Athletes with a higher proportion of lean muscle mass tend to perform better in both strength and endurance sports, as they have the power and stamina to sustain high levels of activity. He points out that nutrition plays a significant role in achieving optimal body composition, as diet directly influences muscle development, fat reduction, and recovery, "in physical education and sports science who has conducted significant studies on how body structure

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and height impact athletic performance." (Pop owczak et al 2022). The Functional Form of the Relationship between Body Height, Body Mass Index and Change of Direction Speed, Agility in Elite Female Basketball and Handball Players. International journal of environmental research and public health, 19(22), 15038.) taller athletes are generally at an advantage in sports that rely on height for leverage, reach, or jumping ability, such as basketball, volleyball, and high jump. The longer limbs and greater height of taller athletes allow them to cover more ground and execute more powerful movements, especially in sports that involve overhead motions. In basketball, for instance, a taller athlete can reach higher and block shots more effectively, while in high jump, their height helps them clear greater distances.

However, height isn't always a determinant of success. shorter athletes tend to excel in sports where agility, flexibility, and fast, precise movements are critical. In sports like gymnastics, martial arts, and sprinting, shorter athletes typically have a more compact body, allowing them to maintain better balance and change directions swiftly. Underscoring the importance of body composition, noting that an athlete's muscle mass, fat percentage, and overall body fat distribution significantly influence performance outcomes. Athletes who maintain an ideal muscle-to-fat ratio are better equipped for both strength-based and endurance sports, as they have the power, stamina, and agility required to succeed.

"Long distance runners and throwers did not significantly differ in terms of Appearance Orientation and Overweight Preoccupation." (Wilson et al., 2012) The study used MANOVA to compare the body image of long-distance runners and throwers, measuring various body image factors through the BISS and MBSRQ-AS subscales. Results showed a significant multivariate effect, indicating that the two groups differed in their body image perceptions. Long-distance runners had more favorable body image ratings than throwers on Appearance Evaluation, Body Areas Satisfaction, Self-Classified Weight, and BISS. The two groups did not significantly differ in terms of Appearance Orientation and Overweight Preoccupation.

The second part of the study examined how sport type and body ideal (sport vs. societal attractiveness) influenced body dissatisfaction. A significant interaction between sport type and body ideal was found. Runners preferred a smaller body for sport compared to societal ideals, while throwers preferred a larger body for sport compared to societal ideals. Runners expressed greater body dissatisfaction regarding their sport body ideal but less dissatisfaction with societal attractiveness compared to throwers, who desired smaller bodies for societal standards.

In summary, long-distance runners generally had a more favorable body image than throwers, and both groups showed different patterns of body dissatisfaction depending on their sport-related and societal attractiveness ideals.

"Sport science is intended to improve sports performance, and this review considered the question "Does increasing an athletes strength improve sports performance?" (Steele et al., 2020) Considering the ARMSS, evidence seems lacking regarding whether improvements in muscular strength are causally related to sports performance" The study compared body image perceptions between long-distance runners and throwers using various body image measures. It found that runners had more positive body image ratings than throwers in areas like Appearance Evaluation, Body Areas Satisfaction, Self-Classified Weight, and BISS, though the two groups didn't differ in Appearance Orientation and Overweight Preoccupation.

Additionally, when considering both sport- specific and societal attractiveness body ideals, runners preferred a smaller body for sport compared to societal ideals, while throwers preferred a larger body for sport. Runners were more dissatisfied with their sport body ideal but less dissatisfied with their societal attractiveness body ideal compared to throwers, who wanted smaller bodies for societal attractiveness.

In essence, long-distance runners had a more favorable body image overall and showed different patterns of dissatisfaction based on their sport and societal body ideals.

"Skeletal muscle fibers contain a large number of different proteins facilitating contraction; some are purely structural, with the sole purpose of maintaining the physical structure of the fiber as force is produced" (Anderson & Aagaard, 2010) Skeletal muscle fibers contain a wide variety of proteins that play crucial roles in muscle contraction. These proteins can be broadly classified into two categories: structural proteins and contractile proteins. The structural proteins primarily serve to maintain the physical integrity and structure of the muscle fiber as it generates force. On the other hand, the contractile proteins directly contribute to the muscle's ability to contract. Among the many contractile proteins, the two most important are myosin (which forms the thick filament) and actin (which forms the thin filament).

When a muscle contraction is initiated, the interaction between actin and myosin is central to the process. These

two proteins couple with one another, undergo a conformational change, and slide past each other in opposite directions. Once they've moved, they uncouple and reload, preparing for the next interaction with the actin or myosin molecule that passes by. This process continuously repeats, which ultimately generates muscle contraction.

In human skeletal muscle, actin is found in a single form, but myosin is more complex. Specifically, the myosin heavy chain (My HC) exists in three distinct isoforms, which are essentially different versions of the same protein but with subtle differences that affect muscle performance. These My HC isoforms play a significant role in determining the functional characteristics of the muscle fiber. The most critical factor influenced by My HC isoform composition is the velocity of contraction—how fast the muscle can contract. Thus, the presence of specific My HC isoforms in muscle fibers is a key determinant of how those fibers perform.

Despite the existence of three primary My HC isoforms, human skeletal muscle fibers often contain a combination of two different isoforms within a single fiber. This dual presence of My HC isoforms means that, rather than having just three distinct muscle fiber types, the human skeletal muscle system can exhibit a more complex range of fiber types. Depending on the specific isoforms present, this can expand the potential fiber types from three to five or create a continuum of fibers that transition from slow-twitch to fast-twitch characteristics.

In addition to My HC isoforms, other proteins also influence the contraction characteristics of muscle fibers, such as those involved in metabolism, but these are beyond the immediate focus of this review. While My HC isoforms remain the primary determinant of fiber type and contraction speed, it is the combination of these is of orms within a muscle fiber that leads to the diversity of muscle fiber types observed in humans. This complexity allows for a nuanced range of muscle functions, from endurance-based activities to those requiring rapid, powerful movements.

"The fact that martial art sports have characteristic weight categories, athletes strive for the optimal or ideal body composition, where strategy is aimed to favoring muscle compared to fat tissue." (Dopsaj et al., 2017) Martial arts sports typically have specific weight categories, and athletes often focus on achieving an optimal body composition. Their goal is to increase muscle mass while reducing body fat, as this helps enhance key attributes like strength, power, and speed, which are crucial for performance. By prioritizing muscle over fat, fighters can maximize their contractile potential. To add on, differences in body structure and various individual factors play a role in determining the ideal physique for athletes in these sports. This understanding provides guidance for developing a more effective morphological model—one that athletes can aim for through targeted training and proper nutrition. Monitoring key body composition indicators can also serve as a valuable tool for managing body weight, especially during intense periods of weight class changes. This ensures athletes maintain their physical performance and avoid losing important elements of their fitness during rapid adjustments.

Chapter III:

Methodology:

This study tries to explore the relationship between height and weight's ability to impact in sport. Whether a person might be made for a sport or if it is all up to a person's dedication and training, the stud tries to find an answer to however a human was created, would they still have a fair shot in a sport if they trained their whole life or if the way his body is built has a higher favor in them achieving success in that said sport. The sport we are focusing specifically on is Mixed Marital Arts which includes boxing Brazilian ju-jitsu Muay Thai and many more. This study concludes several type of tests to see what body is capable to do.

Rationale of the Study:

Our objective is to analyze the relationship between physical attributes (height, weight) and ranked athletic performance using collected data from the respected sport's participants.

The research team heading to the number one MMA gym in the emirate, Black wolf MMA, they chose It because it had an advantage in the many students train there exceeded the number of our second option which was Spartan MMA. Even though the latter gym had better equipment and a more luxurious center we believe that that it doesn't have anything to do with athletic ability, It is all about the quality of training. The type of research was qualitative, the researchers conducted one survey on google forms, it is reviews produced an image where it is a superior platform for surveys with a reliable server, easy compatibility across most devices and operating systems, unlike it is competition which weren't compatible and had slow response time. We did not conclude interrelationships.

Data Gathering Procedures:

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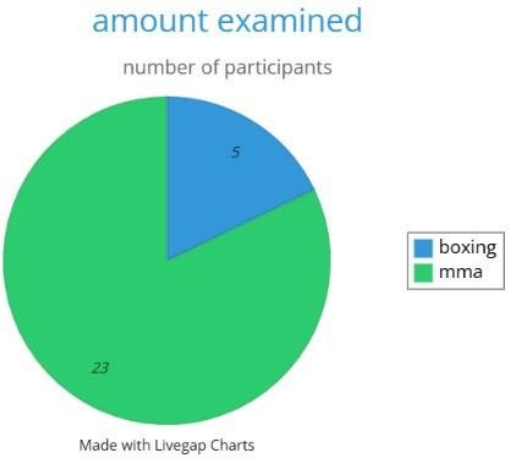
The research team had to ask every individual if they could take their height and weight for a research report. The individuals that agreed were walked to the scale where they got their weight jotted down and their height measured.

Our instruments were two Tape measure and a scale, the tape measure was provided by the research team while the scale was a professional grade scale found in the gym. Our instruments' validity and reliability was built on the fact that we measured the participants height twice with two different tape measured to avoid errors, after we took their height twice with each tape measure we calculated the mean of all 4 values and used the product of our calculation. For the weight we asked the for their weight then measured their weight using an industry grade scale used professionally.

The subjects of our study were mostly teenagers from the ages of 13-19 , one man in his early 20's and one in his mid 40's, they share the same regional background, descent and all participants live in the same city and they are all under the same management. The researchers chose to include all the test participants to enhance variety, richness and depth of their research the total number of the population is 28. but the people who submitted to the survey were 56. we conducted a different survey on why did they not show up and the results concluded were that the participants who could not come were not able to participate due to their final exams in their respective schools being the week after. To conclude, A total of 28 participants will be selected from a population of 56 students enrolled in the Blackwolf Boxing and ju jitsu gym at a large respectable gym in Al khan, Sharjah, UAE the population has a rich culture variety, composed primarily of Arabs and South Arabs and South, south and west Indians Moreover, 50% of students at this gym are enrolled in the competition list, which makes them eligible to compete semi-professionally or professionally, which -professionally which adds to the validity of the research.

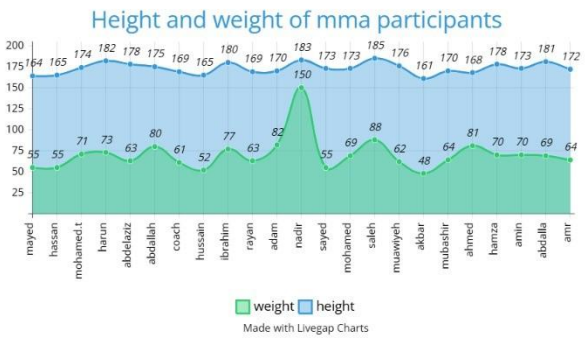
Chapter IV:

Results and Analysis:



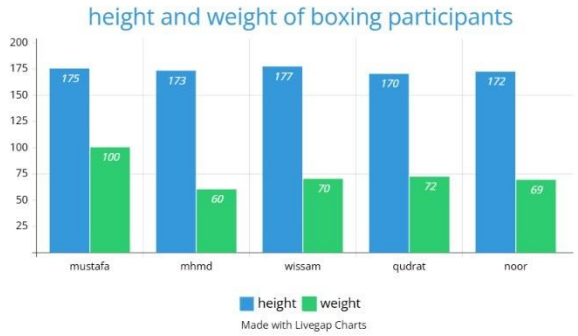
• Comparing Participant Numbers in Boxing and MMA.

The pie graph shown here compares the number of participants across Boxing and MMA as explained in the title. The graph shows us that MMA highlighted with the color green have 23 total participants making up most of the people recorded. Oppositely the Boxing participants are 5 in total and are highlighted with the color blue, a clear contrast between the amount of participants with the MMA fighters making up the vast majority of the total participants, 82% to be exact in percentages. While the Boxers only being 5 out of the 28, to be exact they make up the remaining 18% of the total participants. This was due to the shortage of time we had between sessions as there was a Boxing session coming up and we were not allowed to stay too long because the coaches thought we would disturb their hard work and training so after only recording 5 participants we had to leave. Meanwhile the MMA fighters had just ended their training, and they had ended all of their training sessions for the day so we had as much time as we wanted to measure their height and weight, which explains why the MMA fighters are the majority.



BMI Distribution Among Boxing Participants

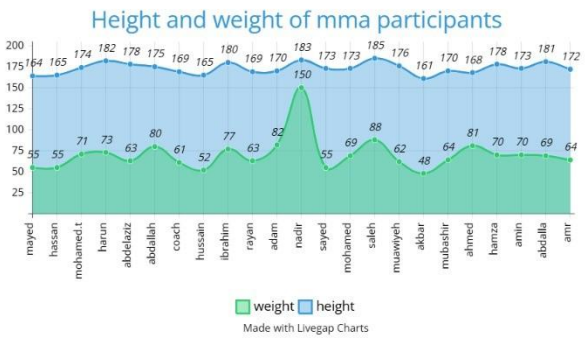
A line graph displaying BMI values for five of the Boxers. Mustafa with a BMI of 35 which falls into the obesity class II category. Meanwhile the rest of the participants are in the 18.5-24.9 BMI category which falls under the normal weight category. Mohamed's BMI is recorded to be 20 while Wissams BMI is recorded to be 22.3, which as stated before is considered normal weight. In addition to that Qudrat and Noor are also in the normal weight category with Qudrat recorded at 24.9 just bordering the overweight category while Noor's BMI is recorded to be 23.3 on the BMI scale. according to the BMI scale Mustafa is overweight and not in shape which is not true as he is actually very muscular and is the strongest out of all the Boxing participants. This proves the fact that the BMI scale is not accurate and should not be used to measure athletic ability ability right? what could be used instead is the accurate body composition scale machine which can accurately calculate an individuals body fat percentage as well as their muscle mass, protein mass and metabolic rate which is much more accurate and beneficial. The only issue with this machine is that it is pricey to measure ones body composition so measuring the body composition of 28different participants was not an option as it was too pricey. Does this mean that the BMI scale is inferior and the less expensive option? the short answer to that is not at all, its not as effective for bodybuilders to be exact however it is an indispensable and irreplaceable tool to measure ones athletic ability. The BMI scale is helpful because although it cannot distinguish between muscle and fat its still useful because even if an individual has a high amount of muscle he will not be as athletic as a guy with less muscle mass no matter how much stronger he would be because athletic ability is not only strength, if it is bodybuilders would be the most athletic, which is the reason nobody builder can compete with a fighter even if its a 100 kg bodybuilder vs a 60 kg fighter; the fighter will always win because of his explosiveness and due to the nerves accumilted in his muscle fibers. This proves the usefulness of the BMI scale in order to measure an individuals athletic ability, soal though Mustafa is the strongest and most muscular, he is not the most athletic by far as to be athletic you would need to be in a low BMI scale, not underweight though normal weight and just a bit overweight on the scale is perfect for maximum athletithism.



Height and Weight of Boxing Participants.

A double bar graph which plots height (cm) and weight (kg) for the five Boxing participants Mustafa, Mohamed, Wissam, Qudrat, and Noor. Mustafa is by far the one with the highest average being 175 and 100 kg. Meanwhile Wissam is taller by two cm standing at 177 cm, although his weight is much less at 70 kg which is good for a boxer. out of the two fighters the one with a higher athletic ability is definitely Wissam because of his leaner physique by is able to complete athletic movements much quicker and more efficiently than Mustafa because Mustafa's muscle mass does not allow him to move at Wissams speed. The next three fighters are similar in weight and height with Mohamed at 173 cm and 60 kg, Qudrat at 170cm and 72 kg, and Noor at 172 cm and 69 kg. The more athletic of the three is pretty obvious if you have been following what i have been saying, it is a very even match between Qudrat and Noor but Mohamed although a bit taller is 10 kg lighter so he does not stand a chance against the two in strength related activities however anything to do with agility is going to be his victory! Qudrat is higher in weight while Noor has the height advantage, it all depends on whether the weight advantage Qudrat has on Noor is muscle and not fat, if so then Qudrat has the advantage however if it is fat then he is in a disadvantage making Noor the most athletic of the three.

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Height and Weight of MMA Participants.

This clustered line chart outlines height and weight for MMA athletes with the y axis being weight and the x axis being the names of the participants, it seems as the weight of the participants is in another line clearly showing the height and weight of each participant with no flaws. The structure of the graph compares the height and weight of each participant in comparison to each other. As seen in the graph Nadir has the highest average numbers in this entire research standing at 183 cm and 150 kg, this makes him the least athletic out of all the participants due to his extremely high height and weight, this makes him unable to compare to his peers athletic performances. Another participant with high numbers is Sales standing at 185 cm and 88 kg he might seem like the second least athletic person which is far from the truth as the weight he has is all muscle and it is not body building muscles which basically is stiff muscles unable to move quickly with explosiveness, as well as the actual muscle fibers themselves being filled with nerves making athletic muscles stronger. Saleh is actually one of the most athletic people on this list as he is not only strong but is agile as well. however he does not compare to the more athletic people on this list. One of the more athletic people on the list is Amin standing at 173 cmand 70 kg which makes him extremely strong and fast which are the most important aspects in the world of athleticism. Another example is Akbar who is a mere 48 kg and 161cm which does not seem very strong however this makes him extremely agile making him an athletic freak.

• Importance of Height and Weight in Combat Sports

1. Biomechanical Advantages - Height:

- Taller fighters have longer limbs allowing for longer striking ranges and greater defense, critical in Boxing and MMA as they can easily reach the opponent without the opponent reaching them.

- Shorter height aids in evading takedowns in MMA or evading punches in both MMA and Boxing as the shorter height makes them harder to hit as there is a smaller hit box.

• Weight:

- Power: Heavier athletes are able to generate greater force in strikes because of their higher weight and more muscle mass (e.g., knockouts in boxing) and grappling (e.g., takedowns in MMA)).

- Endurance: Higher weight may reduce agility and stamina, particularly in weight- class sports requiring rapid movement however it makes you able to take more punches than lighter weighted individuals.

• Weight Classes and Fairness Combat sports categorize athletes by weight to ensure even matches. For example: Boxers in a heavier weight class like heavy weight rely on strength and endurance being able to deliver powerful punches as well as having the endurance to recieve strong punches. However in the lower weight classes like feather weights rely on speed and reaction time to dodge their opponents punches and counter attack swiftly in order to achieve victory. The case is similar in MMA as the Boxing part applies to it, in addition higher weight classes make it easier to defend ground grappling as heavier weight classes can overpower their opponent on the ground. Lower weight classes can still usetheir flexibility to defend against takedowns and grappling.

• BMI and Athletic Performance While BMI is seen as not very effective in the world of bodybuilding, it is very useful to measure ones athletic ability as a lower BMI is crucial for the agility part of athleticism. Although with weight classes it does not make that big a difference because of the close BMI range, however if we are talking pound for pound it does. Obviously strength would go to the higher BMI and agility would go to the lower, but in total the more athletic group would definitely be the lower weight classes due to their low BMI rating as well as their explosive speed and power allowing for greater athletic output. Conclusion: This methodology provides a structured approach to examining the influence of height and body shape on athletic performance. By combining quantitative data analysis and qualitative insights, this study will offer a deeper understanding of how these physical traits impact success in various sports. The findings from this research will contribute to the broader conversation on optimizing athletic performance, guiding future training practices, and potentially informing athlete selection processes. Ultimately, this study aims to shed light on the complex relationship between physical characteristics and athletic ability, helping to refine how we approach sports performance from both a scientific and practical perspective.

Chapter V:

Acknowledgments

We are deeply grateful to everyone who helped and supported us in making this Research paper possible.

Firstly, we would like to express our sincere gratitude to Coach Ali for allowing us to use the gym, which was crucial for the collection data. We appreciate Coach Murad, Farad, and Ikrom for their assistance in taking measurements of the boxing participants, which helped with the validity of our data. Moreover, Coach Hassan provided support in the coordination of measurements for the MMA participants, greatly greatly assisting in our research.

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Conclusion

The interaction between height, body type, and athletic performance is a vast area of research that highlights the intricate interactions between human biological attributes and the specific demands of sport. This research has shown that although height and body composition are commonly considered innate advantages or limitations in sport, their influence is largely contingent upon the context within which they are assessed. Individual sports, including basketball, rowing, and volleyball, tend to reward taller competitors since height is biomechanically beneficial in the form of enhanced reach, leverage, and stride length. Conversely, gymnastics, figure skating, and distance running are often most successfully performed by shorter competitors, who are aided by lower centers of gravity, better balance, and in most instances, more favorable relative strength-to-weight ratios.

Human body structure, in general, is referred to as somatotype (ectomorph, mesomorph, and endomorph) in scholarly discourse, and it strongly affects athletic specialization. For example, those of the mesomorph type, characterized by muscle build, tend to perform better in sports that require explosive strength, such as sprinting, wrestling, and American football. Ectomorphs, being less muscular, would do better at endurance events like long-distance running and cycling, while endomorphs would be more suited to events that require mass and strength, like shot put or sumo wrestling. The point to remember here is that these are generalizations based on statistical trends, not guarantees of success.

Furthermore, the advancement of training and sports science technologies has allowed sportspersons to optimize performance regardless of their natural body characteristics. Strength and conditioning regimes, personalized nutrition, and skill-specific training have all contributed significantly to narrowing the gap between innate ability and actual performance. Sportspersons are now more capable than ever of compensating for perceived physical shortcomings through specialized development. For instance, shorter athletes in basketball have thrived by enhancing their speed, agility, and shooting accuracy—traits that counterbalance the disadvantage in height.

The psychological factors involved in sporting success deserve important consideration. Traits like motivation, resilience, focus, and strategic thinking transcend physical attributes and often determine outcomes at the elite level. Additionally, environmental and socio-economic factors, like access to quality training facilities and support networks, play a crucial role in shaping an athlete's ability. Thus, height and body type must be seen as only two factors in a much larger equation.

It is essential to take into account cultural and societal norms that tend to shape attitudes regarding anticipated bodily appearance among sportspersons. Media representation and bias at recruitment levels tends to discourage qualified individuals whose body type fails to fit the stereotyped model of a sportsperson for a particular sport. These limitations not only thwart diversity in sports but also sidestep the potential constructive value of ability-based progression and versatility. With the increase in inclusivity and data-informed thought within sport, sporting potential has

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increasingly been understood to include, but not be limited to, physical factors.

It is equally important to examine how cultural and systemic factors impact athletic development and perception. Societal expectations and recruitment practices may favor athletes with certain body types, often overlooking others with equal or greater potential. For example, height biases in basketball or body mass preferences in football can limit diversity within teams and discourage athletes who fall outside the stereotypical mold (Eitzen, 2009). Encouraging a more inclusive approach—based on ability, adaptability, and potential for growth—can enrich the talent pool and result in more dynamic teams and competition.

Another important factor to investigate is the effect of gender on how height and body composition impact sporting performance. Differences in biological factors between female and male competitors, such as hormone levels and muscle mass distribution, can influence the degree to which these physical traits are associated with performance outcomes (Smith, 2019). For instance, while increased height can be beneficial for both male and female volleyball players, the average vertical jump height has gender differences due to variations in muscular strength and neuromuscular efficiency. Female athletes also often face unique challenges related to body image and social norms, indirectly influencing performance through psychological stress and motivation (Krane et al., 2004). As gender equity continues to evolve in sport, it becomes ever more important to appreciate the ways that physical and cultural factors intersect to affect performance and participation at every level of competition.

In short, while the influence of height and build on athletic capability is enormous, it is not complete. Although specific physical characteristics provide apparent benefits in precise sport scenarios, they must be considered in context with other characteristics, including the standard of training, mental toughness, environment, and access to resources. Sporting achievement is optimally explained as a consequence of an interaction amid hereditary influences and environmental pressures. Through a holistic approach and the increasing focus of sports science research, coaches and athletes will be able to identify and develop talent to increase a broad range of body sizes and shapes. This evidence-based and inclusive strategy will not only make for a fairer sporting environment but will also extend the limits of what can be achieved in human performance.

Last, though stature and body composition are undoubtedly significant factors in sports performance, they are not determinant in an absolute sense. Their influence is highly variable, contingent upon the sport in question, position played, and the capacity of the athlete to adapt and undertake efficacious training. A comprehensive approach that deals with physiological, psychological, training, and opportunity factors is needed to assess athletic success. Research in the future needs to keep examining the interaction between these variables and attempt to develop more inclusive talent identification and training methods that enable athletes of different body types to excel.

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